PCB ANTENNA FOR RECEIVING DIFFERENT POLARIZATION SIGNALS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a PCB antenna and, more particularly, to a PCB antenna for receiving different polarization signals.

2. Description of Related Art

Currently, the use of the wireless communication products is increasingly popular in people's life. For example, everyone has a cell phone and the technology of the mobile communication is evolving into 3G ages. The bluetooth products and the wireless LAN products such as IEEE 802.11b are also very popular in the market. These wireless communication products have to be small in size, good-looking in appearance and convenient to carry. However, the current antenna integrated with the wireless communication product will occupy too much space, resulting in damaging the entirety perception. Moreover, the antenna can receive a single polarization signal. Therefore, it is desirable to provide an improved antenna device to mitigate and/or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

The first object of the present invention is to provide a PCB antenna for receiving different polarization signals, including the co-polar signal and the cross-polar signal, at the same time.

The second object of the present invention is to provide a PCB antenna for receiving different polarization signals in which the PCB

antenna is small and light.

The third object of the present invention is to provide a PCB antenna for receiving different polarization signals, which can be integrated with an appearance of an apparatus easily thereby being hidden in the apparatus.

The fourth object of the present invention is to provide a PCB antenna for receiving different polarization signals, which can reduce the cost and improve the yield of the integration of the PCB antenna with the target apparatus.

To achieve the object, the PCB antenna for receiving different polarization signals with a signal processing unit of the present invention compress: a substrate ; an emission electrode printed on the substrate, and having a plurality of circular electrodes and a plurality of metal splices for receiving a polarization signal, wherein the metal splices are located between the circular electrodes and respectively connected with each circular electrode; and a receiving unit located one of the ends of the substrate, and connected with the circular electrodes the signal processing unit via an external transmission unit.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the antenna in accordance with the present invention.

FIG. 2 is a connection diagram with microstrip line feed of the

present invention.

FIG. 3 is a Smith chart of the present invention.

FIG. 4 is a diagram of the voltage standing wave ratio (VSWR) of the present invention.

FIG. 5 ~ FIG.9 are the measuring result of the radiation pattern of the present invention in different angle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG.1 and FIG.2 show the perspective view and connection diagram with microstrip line feed of the present invention. As shown, the PCB antenna includes a substrate 1, a emission electrode 2 and receiving units 31 and 32, wherein the emission electrode 2 further includes two circular electrodes 21 and 22 and three metal splices 23,24 and 25. The receiving unit 31 is connected with a signal processing unit 5 via an external transmission unit 41, and the receiving unit 32 is connected with the signal processing unit 5 via an external transmission unit 42.

The emission electrode 2 is printed on the substrate 1 via the PCB processing. In this preferred embodiment, the substrate 1 is an insulator, and the insulating material of the substrate 1 and the thickness of the substrate 1 can be selected as desired.

The size of the circular electrode 21 is larger than the size of the circular electrode 22. That is, the outer diameter of the circular electrode 22 is small than the inside diameter of the circular electrode 21, and there are three metal splices 23,24 and 25 that are connected with the circular electrodes 21 and 22 respectively between the circular electrode 21 and the

circular electrode 22 so that the circular electrode21 and the circular electrode 22 form a short circuit to obtain the best sensitivity.

In the preferred embodiment, the ratio of the outer diameter 211 of the circular electrode 21 to the inside diameter 212 of the circular electrode 21 is between 1.3~1.35, and the best ratio is 1.325. The ratio of the outer diameter 221 of the circular electrode 22 to the inside diameter 222 of the circular electrode 22 is between 1.65~1.75, and the best ratio is 1.7. The ratio of the inside diameter 212 of the circular electrode 21 to the outer diameter 221 of the circular electrode 22 is between 1.35~1.45, and the best ratio is 1.4.

In this preferred embodiment, the receiving unit 31 preferably uses coaxial fed, and the receiving unit 32 preferably uses microstrip fed. FIG.1 shows the receiving unit 21 using a coaxial connection for connecting the external transmission unit 41 that has a shielding net so that the circular electrodes 21 and 22 are capable of receiving the co-polar signal and cross-polar signals at the same time, and then transmitting the co-polar signal and cross-polar signals to the signal processing unit 5. FIG.2 shows the receiving unit 22 using microstrip line for transmitting the co-polar signal and cross-polar signals to the signal processing unit 5 via the external transmission unit 42 printed on the substrate 1.

FIG.3 shows the Smith chart obtained from measuring the PCB antenna by a network analyzer. There are three major data in the FIG.3. Namely, when the frequency is 2.4 GHz, the input impedance of the real part is 50.872 Ω and the input impedance of the imaginary part is (–4.137j)

Ω. When the frequency is 2.45 GHz, the input impedance of the real part is 49.083 Ω and the input impedance of the imaginary part is (–2.773j) Ω. When the frequency is 2.5 GHz, the input impedance of the real part is 46.904 Ω and the input impedance of the imaginary part is (–936.538j) mini Ω.

FIG.4 shows the voltage standing wave ratio (VSWR) of the PCB antenna, wherein the chart represents the degree of the reflection. The VSWR of the prior PCB antenna is about three. The VSWR of the PCB antenna of the present invention is 1.103,1.060 and 1.040 when the frequency is 2.4GHz, 2.45GHz and 2.5GHz, respectively.

FIG.5~FIG.9 show the radiation pattern of the present invention in any angle. The PCB antenna of the present invention is capable of receiving any kind of polarization signals such as co-polarization signal and cross-polarization signal at the same time based on the radiation patterns for improving the sensitivity.

In brief, the present invention utilities a substrate printed with an emission unit having two circular electrodes of different sizes, wherein there are three metal splices connected with the two circular electrodes so that the two circular patterns form a short circuit to obtain the best sensitivity and receive the co-polarization signal and the cross-polarization signal at the same time.

Although the present invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit

and scope of the invention as hereinafter claimed.